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Subject: FW: Unstable Slopes Research Overview
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FYI – good summary of WA Forests and Fish unstable slopes program. Relevant to WA F&F adaptive mgmt. and future ID and OR efforts related to unstable slopes. Dave

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Subject: Unstable Slopes Research Overview

Policy participants -

The attached document summarizes the existing unstable slopes research strategy for review for the upcoming Policy meeting.

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SUMMARY OF THE UNSTABLE SLOPES RULE GROUP RESEARCH STRATEGY

The FP HCP goal for the management of potentially unstable slopes is to prevent forest practices from increasing or accelerating mass wasting (landslides) beyond naturally occurring rates. The intent of the goal and its related rules is to protect water quality and aquatic habitat by minimizing sediment delivery from management-related increases in mass wasting. The Unstable Slopes research strategy is focused on evaluating whether the rules achieve the following Resource Objectives and Performance Targets:

Resource Objectives:

- Sediment: Provide clean water and substrate and maintain channel-forming processes by minimizing to the maximum extent practicable the delivery of management-induced coarse and fine sediment to streams (including timing and quantity) by protecting stream bank integrity, providing vegetative filtering, protecting unstable slopes, and preventing the routing of sediment to the streams.

Performance Targets:

- Road-related: Virtually none triggered by new roads; favorable trend on old roads.
- Timber harvesting-related: No increase over natural background rates from harvest on a landscape-scale on high-risk sites.

Rule Group Strategy

Table 1 below contains critical questions established for the Unstable Slopes Rule Group and identifies a series of programs and studies to address them. The strategy is to implement an unstable-landform identification program to address the first two critical questions, and then to design and implement mass wasting effectiveness monitoring and validation programs to assess the effectiveness of landform recognition and mitigation at various scales.

Table 1. Unstable Slopes Rule Group Critical Questions, Programs, and Projects

Rule Group Critical Questions	Study Project Titles
Unstable Landform Identification Program	
<i>The purpose of the Unstable Landform Identification Program is to provide a set of screening tools to identify forested areas containing potentially unstable slopes and to focus field verification activities on potential problem areas, thereby improving our ability to avoid them.</i> <i>This program consists of five projects that provide statewide information on the distribution of unstable landforms. Two projects are completed, one was underway but is now on hold due to budget constraints, one is partially completed and has been on hold, and one has not yet been started.</i>	
What screening tools can be developed to assist in the identification of potentially unstable landforms that minimize the omission of potentially unstable landforms?	<ul style="list-style-type: none"> • Shallow Rapid Landslide Screen for GIS [Phase 3 suspended] • Technical Guidelines for Geotechnical Reports [Completed] • Regional Unstable Landforms Identification Project (RLIP) [Completed] • Landform Hazard Classification System and Mapping Protocols [Completed] • Landslide Hazard Zonation [Phase 3 suspended]
Glacial Deep-Seated Landslides Program	

<p><i>The purpose of the Glacial Deep-Seated Landsides Program is to develop science, tools, and/or guidance for assessing the resource impact potential of deep-seated landslides in glacial sediments resulting from changes in groundwater hydrology during and after timber harvest in the landslide recharge area. Each of the five listed projects develops tools or science that helps us address the critical question, “Does harvesting of the recharge area of a glacial deep-seated landslide promote its instability?”</i></p>	
<p>Does harvesting of the recharge area of a glacial deep-seated landslide promote its instability?</p>	<ul style="list-style-type: none"> • Model Evapo-Transpiration in Deep-Seated Landslide Recharge Areas [Completed] • Evapo-Transpiration Model Refinement [Scoped but on hold] • Landslide Classification [Scoped but on hold] • Groundwater Recharge Modeling [Scoped but on hold] • Board Manual Revision [On hold]
<p>Mass Wasting Effectiveness Monitoring Program</p>	
<p><i>The purpose of the Mass Wasting Effectiveness Monitoring Program is to assess the degree to which implementation of the forest practices rules is preventing or avoiding an increase in landsliding beyond natural background levels. Four projects are proposed. The first, Unstable Slope Criteria Project (which replaced the Testing the Accuracy of Unstable Landform Identification Project), is being re-scoped as a pilot project under the LEAN process in response to FP Board direction and Policy feedback. The second, The Mass Wasting Effectiveness Monitoring Project: An examination of the landslide response to the December 2007 storm in Southwestern Washington has been submitted as a non-consensus report to Policy. The third, Mass Wasting Landscape-Scale Effectiveness Monitoring Project, has been preliminarily scoped. The fourth, Mass Wasting Buffer Integrity and Windthrow Assessment Project, is on hold.</i></p>	
<p>Are unstable landforms being correctly and uniformly identified and evaluated for potential hazard?</p>	<ul style="list-style-type: none"> • Unstable Slope Criteria (which replaced the Testing the Accuracy of Unstable Landform Identification Project) [Unscoped Priority]
<p>Are the forest practices unstable slopes rules reducing the rate of management-induced landsliding at the landscape scale?</p> <p>Are the mass wasting prescriptions and mitigation measures effective in preventing landslides from roads and harvest units?</p>	<ul style="list-style-type: none"> • Mass Wasting Effectiveness Monitoring [Completed]
<p>How does the rate of landsliding on managed lands compare to an estimate of the natural (background) rate?</p> <p>Are the forest practices unstable-landform rules effective at reducing the rate of management-induced landsliding at the landscape scale?</p> <p>Are the mass wasting prescriptions and mitigation measures effective in preventing landslides from roads and harvest units?</p>	<ul style="list-style-type: none"> • Mass Wasting Landscape-Scale Effectiveness Monitoring [Preliminarily scoped and on hold]

Does windthrow on mass wasting buffers (leave areas) increase mass wasting?	<ul style="list-style-type: none"> Mass Wasting Buffer Integrity and Windthrow Assessment [Unscoped]
Mass Wasting Validation Program	
<i>This program links to adaptive management by answering the biological “so what” question about the effectiveness of the unstable slopes rules and about the mass wasting performance targets. The key objective of projects developed in this program will be to understand, at a watershed scale, the cumulative effects of different sediment loads in the context of rates of management-induced versus natural landslides.</i>	
What levels of cumulative sediment inputs are harmful to aquatic resources at the basin scale?	<ul style="list-style-type: none"> No projects have been developed [Unscoped]

Gaps in Research Identified in the CMER workplan:

- Unstable Slopes Identification Program: Screening tools using LIDAR may be needed to replace current tools.
- Unstable Slopes Identification Program: Compete remaining WAUs for LHZ project when funded by legislature.
- Glacial Deep-Seated Landslide Program: Near-term research efforts should focus on making *empirical* determinations of the degree to which (1) cumulative winter evapo-transpiration within the forest is significant, (2) vegetation conversion results in a significant decrease in cumulative winter evapo-transpiration, and (3) groundwater storage levels are changed. In addition, typical values of the aquifer parameter for different types of glacial lacustrine deposits must be determined for use in the hydrogeologic portion of the model.
- Mass Wasting Effectiveness Monitoring Program: The Post-Mortem Project is limited to landslides from a single storm in a portion of southwest Washington, which does not allow for inference to be made at the landscape level. Additional data analysis and limited additional data collection may be necessary to address gaps, and may be undertaken in conjunction with Policy guidance.
- Mass Wasting Effectiveness Monitoring Program: Because the Post-Mortem study area didn't experience significant windthrow, a separate study will be needed to assess windthrow on unstable slope leave areas.

